

common with the savages than with us, or may have been specially prominent in those selected for experiment.

Gildown, February 16

J. RAND CAPRON

### Erosion of Glass

SOME time in the end of 1882 Surgeon-Major Biden, writing from Madras, related in NATURE that certain glass vases on which white-ant mud had been deposited had been eroded over the area of deposit in such a way as to suggest that an acid having, like hydrofluoric acid, a power of dissolving glass, was present in the "mud." On reading this I was reminded of the observations of my teacher, Mr. George Rainey, recently deceased.

Mr. Rainey, in the course of his observations on molecular coalescence, had shown that when carbonate of lime was deposited in spherical forms on the surface of a glass slide in the presence of a strong solution of gum, the glass was eroded at every point of contact of a sphere. He explained the phenomenon, as I believe rightly, by the principle of molecular coalescence. In the embrace of the colloid, gum, the molecules of the glass adjoining the spheres were drawn into the spheres, and a little cup corresponded to each sphere-contact. There was certainly no question of the action of an acid, the solutions used being distinctly alkaline.

Inspection of the bottles in which the substances have been kept will show that carbonate of lime, moist or dry, carbonate of potash, moist or dry, chloride of calcium, moist or dry, do not in the absence of colloids erode glass. It appeared to me probable that the white-ant mud must consist of a mixture of some colloid with carbonate of lime or some other salt capable of taking spherical form. I wrote to Surgeon-Major Biden stating the possibility as it appeared to me, and suggesting that the mud should be examined as regarded colloid and earthy matter. He replied most courteously that the mud was not at the time to be obtained, but sent some of the earth which formed its basis.

Experimenting with this earth alone, I was not able to etch glass. But in view of some interesting speculations which this episode started for me, I have since made some experiments directly bearing on the possibility of the erosion of glass surfaces by saline matters of alkaline reaction deposited on them within a colloid bed or matrix.

I inclose for your inspection a glass slide which has been so treated. More than a year ago this slide was coated with a layer of paraffin, melted on. The word "Ant" was drawn on the side with a wood point, in the expectation that etching might be effected where the paraffin was removed, the wood point being incapable of scratching the glass. The expectation was not entirely fulfilled. The paraffin, not being sticky enough, scaled off in sheets so as to leave the whole surface ultimately exposed. This whole surface is now seen to be etched. At first sight the glass looks as if it were covered with a semi-opaque deposit. But it has been boiled in hydrochloric acid and in water, without any change becoming evident, and under the microscope the appearance rendered is clearly an appearance of erosion.

The details of the experiment were as follows: a strong solution of gum arabic in distilled water was made and filtered. It was divided into two portions. To one was added a small quantity of chloride of calcium, to the other a small quantity of carbonate of potash. A wide-mouthed bottle, three inches in height, was half filled with the first solution, and the second solution was slowly poured on the top of the first, so as to avoid mixture of the two. The slide, prepared, as already described, was placed vertically in the bottle, so that the middle region of the slide corresponded to the level of the meeting of the two solutions.

The slide was found, at the end of a twelvemonth, denuded of its paraffin, and coated with an incrustation of carbonate of lime most dense at and near the meeting level of the two solutions.

Under the microscope the surface of the slide presents many kinds of erosion—spherical, linear, and intermediate. But in proportion as higher and higher objectives are used, all the appearances are shown to be of circular form, the lines, for instance, being resolved into lines of circular pits.

I dare not make this letter too long, and therefore include in it only so much as bears on Surgeon-Major Biden's most interesting communication. It suffices, at the moment, to indicate that the surface of a glass slide may be eroded in a way to suggest the action of an acid, such as hydrofluoric acid, when no free acid is present; and that erosion may occur when the

glass is brought in contact with alkaline fluid, a colloid, and crystalline substances capable of assuming, in the presence of a colloid, spheroidal form.

I propose to state the results of this and other experiments, and some speculations suggested thereby, before the Royal Microscopical Society.

WILLIAM M. ORD

7, Brook Street, W.

### Echium Crossing

THE gardens of Madcira are remarkable for the neglect of native plants. This is due in part to indigenous indifference, and also to a preference for familiar forms amongst people who migrate hither from various regions, though chiefly to the temptation to test the facilities of growth and naturalisation in a moist and equable sub-tropical climate. Hence it is often easier to import species peculiar to Madeira than to find them in their native place; but none the less do these rocks abound with conspicuous examples of interesting genera.

I have cultivated for many years two large echiums upon the terraces of the Luinta do Valle, 300 feet above the sea, namely, *E. fastuosum*, the Madeiran littoral species, a perennial shrub 3 or 4 feet high, with hairy light green leaves and branching stems crowded with scorpioid racemes of light-blue flowers with white stamens. And secondly, *E. simplex*, the giant Canarian species maturing in Madeira in the second year. This remarkable plant has large, smooth, silvery leaves, and terminates its growth in one unbranched stem densely packed with folded flower-stalks bearing pure white blossoms, and forming a pyramid reaching sometimes 14 feet in height. *E. simplex* dies after flowering. The flowers in both species last from three to five weeks, and the unfolded flower-stalks measure 2 to 3 inches in length.

Until 1882 the two echiums, though growing together and having their scented flowers freely visited by bees and insects for their abundant nectar, had remained distinct; but, in 1883, after introducing a swarm of Ligurian bees from England, I found that a cross-fertilisation had been effected, which has left me very few examples of *E. simplex*.

The hybrid Echium possesses the leaves of the giant plant, and the stem merely bifurcates or branches sparingly. The flowers are tinged light blue, and the perennial habit of *E. fastuosum* is expressed by a continual growth of the flower racemes, which, after flowering for two years, measure 26 inches in length, and are still unfolding. The seeds of this hybrid have not germinated.

I am now preparing to effect a cross between *E. simplex* and the handsome mountain *E. caudicans* of this island at my country residence, 2000 feet above the sea.

*E. caudicans* and *E. fastuosum* have frequently blended, producing plants less new in structure than in habit; but such hybrids have been quickly lost, either in sterility or reversion.

Madeira, January 26

MICHAEL GRABHAM

[This is an interesting case of the spontaneous appearance of a hybrid between two very distinct species. The occurrence of such hybrids is frequent in some genera, such as *Verbascum* and *Primula*, and gives systematic botanists much trouble. There is a striking picture of *Echium simplex* at Teneriffe, in the North Gallery at Kew, No. 23.—ED.]

### The Iridescent Clouds

THE coloured fringes and bows described by Mr. N. in Prof. C. Piazzi Smyth's communication (p. 316) are clearly of a totally different character from the iridescent clouds that were so widely remarked in December. I take the "fringes and bows in circles" mentioned by him to be simply the same phenomenon of coloured circles that is so often seen around the moon, which goes by the name of a "corona"; and the reason why it is not easily seen around the sun, except by reflection in glass or water, is that the sun is too dazzling to look at directly. There is another phenomenon of coloured clouds which is probably also alluded to by Mr. N., and that is when thin clouds, usually cirrus, show interference colours, often very vividly; the positions of these colours evidently depending on the structure of the clouds, and being quite irregular with reference to the sun. The iridescent clouds recently observed no doubt owe their colour to the same cause, but the kind of cloud was evidently different, and the colours produced were much more striking. The clouds themselves were quite recognisable as

being of a peculiar type, even when too far from the sun to show any colour. The clouds thus coloured are usually of a much striated or rippled structure, and show the colours generally in small spectra; whereas the clouds seen in December were remarkably smooth in texture, and although often striated, the striations were feeble and comparatively few, and in straight lines, while each cloud showed one regular gradation of colour.

Whether the coloured clouds described by your correspondents, with the exception of those mentioned by Mr. N., were all of the same kind, it is difficult to decide; perhaps they may have been so, in spite of the varieties in their appearance. Some observers describe the body of these clouds as having been dark, in particular your correspondents at Darlington and Broseley (Shropshire), pp. 192, 193, whereas all seen here were white or bright. Still, those clouds seen further south were probably of the same kind, only thicker. The difference in shape is most likely not a radical one, as the larger clouds seen here had wavy, not straight, edges, though their general directions were the same as the sides of the more rectangular ones. The nearest approach here to a pallium of these singular clouds was on the morning of December 12, when there occurred, at 8.15 a.m., an extensive pale steel blue film above the region where the sun was, and reaching to an altitude of 25°.

Dr. H. Geelmuyden, observing at Christiania on December 8 (see p. 264), appears to place the peculiar clouds at a lower level than cirro-cumulus, but as seen here they were always the highest clouds.

In conclusion, I think that Prof. A. S. Herschel is mistaken in supposing these clouds have been "only a good instance of a common sight," but although I never noticed them before, I do not dispute the suggestion of Dr. Geelmuyden that they may be seen more frequently than some of us have thought. I have not seen them since December 13.

T. W. BACKHOUSE

Sunderland, February 11

#### Human Hibernation

I DID not answer your correspondent's query on human hibernation in your issue of the 5th inst. (p. 316), because I thought some one better informed than myself would answer it. However, as no one has done so, I may as well give a solution of this well-known Indian trick which I have seen, but the authority for which, I am sorry to say, I cannot remember. It is very simple, like all these things are when you "know how they are done." A tunnel is dug from the grave to the neighbouring jungle; the grave itself is partly prepared. The subject is then, in sight of the spectators, prepared, by having his ears and nostrils filled with wax, and his tongue turned back. He is then apparently buried, creeps through the tunnel, and gets away. After six months, or any other interval, he creeps back again, is dug up apparently lifeless, and restored with infinite pains. In some cases, I believe, a sentry has been placed over the grave, but, of course, without results.

ALFRED H. HULK  
Bolney House, Ennismore Gardens, S.W., February 13

#### An Error in Ganot's "Physics"

I BEG to call attention to a typical error in a formula which appears to have run through ten editions of Ganot's well-known treatise. It is one not difficult of discovery by that somewhat too rare class of students who carefully plod through all the steps which lead up to it, but very likely to be overlooked by the more common class who are content to extract the formula as it stands with the undoubting faith reasonably based on "Tenth Edition, revised and enlarged."

The formula which represents the weight of air saturated with vapour occurs on p. 325 of the tenth edition, and is printed—

$$P = \frac{0.31 \times V.F.}{(1 + \alpha z) 760} (H - \frac{3}{8} F).$$

The first *F* should obviously be expunged.

E. DOUGLAS ARCHIBALD

Tunbridge Wells, February 16

#### Shadow on Clouds

I AM not aware if the following phenomenon is at all common, but I venture to think it somewhat unusual, and that it might interest some of your readers:—

Whilst at anchor in Cumberland Bay in the Island of Juan Fernandez on the evening of December 24, 1884, we observed the following remarkable sight. The Bay is situated on the north side of the island, and some way inland is a remarkable hill, called the "Yunkua," or "anvil," it being somewhat of the shape of one; it is the highest hill in the place, viz. 3005 feet, and from the anchorage bears about south-west, and is distant two miles. The Bay is closed in by high cliffs and hills. On the day mentioned, shortly after the sun had disappeared behind the western hills, we observed this hill make a distinct shadow on the clouds above it, in which every irregularity and peak came out with wonderful clearness. The shadow lasted till about 30° before the time of sunset (which was invisible to us), and was inverted and inclined to the hill as in a mirage at about 30°. The weather at the time was very fine. Barometer, 30.22; temperature of altitude thermometer, F. 62°; and very few clouds were about.

ALFRED H. TARLETON

H.M.S. *Constance*, at Sea, January 25

#### THE METEOROLOGY OF HAVANA<sup>1</sup>

THIS annual of the Royal College of the Society of Jesus at Havana for 1875, which has just been published, possesses more than a passing interest. The observations were made daily every two hours from 4 a.m. to 10 p.m., and include pressure, temperature, humidity, wind, rain, magnetic, electric, optical, and other weather phenomena. The results are plotted on large monthly diagrams, and as each day has six-tenths of an inch devoted to it, the two-hourly observations of all the different elements can be readily seen and compared with each other; and this part of the work is done with a scrupulous care and accuracy it would not be easy to surpass. On the same diagrams are marked the days on which auroras are reported to have been observed in the United States, as published in the *Monthly Weather Review* at Washington.

A note is appended to each month's observations, drawing attention to the more significant of the magnetic perturbations in their relations to the changes of weather at the time, and in particular to the "nortes," or "norther," of the cooler months of the year. Thus, on April 3, 4, and 5 a "norther" prevailed, which was succeeded on the three following days by a remarkable magnetic perturbation, which was accompanied with a high barometer and a strong wind, rising in the afternoons to a rate of 35 kilometres per hour, with daily manifestations of aurora in the United States, but was unaccompanied throughout with any electric phenomena. Again, the magnetic perturbation, of April 13 was coincident with a characteristic "norther," much thunder and lightning, a very heavy rainfall, and a disposition and state of the aqueous vapour which give rise to solar and lunar halos, and other optical effects; but during the time no auroras were reported from the United States. Father Viñes points out in the monthly notes various other relations between the magnetical and meteorological phenomena which suggest that this line of inquiry is likely to lead to valuable additions to our knowledge of weather changes.

The mean annual pressure at sea-level is 30.067 inches, the maximum being 30.129 inches in January and the minimum 30.002 inches in September, with a secondary maximum of 30.092 inches in July and minimum of 30.066 inches in April. As regards the diurnal oscillation from the morning maximum to the afternoon minimum, the greatest occurs in the winter months, when it amounts to 0.080 inch, whereas in July it is only 0.051 inch. These diurnal and seasonal fluctuations in their varying amounts have no small significance in their relations to the analogous phenomena in the United States and over the high pressure area of the Atlantic. The mean annual temperature is 77°7, rising to the maximum 82°2 in July, and falling to the minimum 73°0 in December. The

<sup>1</sup> "Observaciones Magnéticas y Meteorológicas del Real Colegio de Belén de la Compañía de Jesús en la Habana. Año de 1875." (Habana, 1884.)